CLAIMS

1. Highly purified porous silica microspheres, having nominal diameters in the range of from about 10 microns to about 200 microns, and a porosity of at least about 50%, said microspheres are hydroxylated to create surface silanol groups and reacted with silane containing functional groups, said microspheres having a pH of about 6 to about 7, wherein said functional groups are capable of binding with an impurity in a reaction medium containing the impurity and a reaction product, and selectively remove the impurity.

2. The silica microspheres of claim 1 which have a density of at least about 1.2 grams/cc.

3. The silica microspheres of claim 1 which are prepared from a silica sol prepared by the controlled hydrolysis of an organic silicon compound.

4. The silica microspheres of claim 1 which are prepared from fumed silica.

5. The silica microspheres of claim 1 produced from an organic silicon compound that is tetraethyl-o-silicate.

6. The silica microspheres of claim 1 which are sintered to provide mechanical strength.

7. The silica microspheres of claim 1 wherein the functional groups are selected from monoamines, triamines, tertiary amines, sulfonic acid, sulfonyl chloride, isocyanates, epoxides, diamines, diphenylphosphines, diethylphoshine, mercaptans, alkylbromo, and sulfonyl hydrazine.

8. The silica microspheres of claim 1 which have a purity of at least about 99.99%.

9. A packed bed containing the microspheres of claim 1.

10. A filter containing the microspheres of claim 1.

11. A reservoir containing the microspheres of claim 1.

12. A cartridge containing the microspheres of claim 1.

13. A method for removing impurities from a reaction medium containing a product and impurities comprising

contacting the reaction medium with the functionalized silica microspheres of claim 1 for a sufficient time to allow the microspheres to selectively bind to the impurities, and

separating the functionalized microspheres from the reaction medium leaving substantially all of the product in the reaction medium.

14. The method of claim 13 wherein the silica microspheres have a density of at least about 1.2 grams/cc.

15. The method of claim 13 wherein the silica microspheres are prepared by spray drying a silica sol prepared by the controlled hydrolysis of an organic silicon compound.

16. The method of claim 13 wherein the silica microspheres are prepared by spray drying fumed silica.

17. The method of claim 13 wherein the silica microspheres are sintered to provide mechanical strength.

18. The method of claim 13 wherein the silica microspheres contain functional groups selected from monoamines, triamines, tertiary amines, sulfonic acid, sulfonyl chloride, isocyanates, epoxides, diamines, diphenylphosphines, diethylphosphine, mercaptans, alkylbromo, and sulfonyl hydrazine.

19. The method of claim 13 wherein the silica microspheres have a purity of at least about 99.99%.

20. The method of claim 13 which further comprises passing the reaction medium through a device selected from the group consisting of a packed bed, a filter, a reservoir and a cartridge.

21. A method of removing impurities from a reaction mixture containing a product and impurities comprising:

contacting said reaction mixture with porous silica microspheres, said microspheres having a nominal diameter range of from about 10 microns to about 200 microns, a porosity of at least about 50%, said microspheres having a pH of about 6 to about 7, wherein said microspheres are hydroxylated to create surface silanol groups and reacted with silane containing functional groups, wherein said functional groups are capable of binding with said impurities, thereby selectively removing said impurities from said reaction mixture.

22. The method of claim 21 further comprising separating said porous silica microspheres from said reaction mixture, thereby affording a substantially purified product.

23. The method of claim 21 wherein said reaction mixture is contained in a reaction vessel selected from the group consisting of a packed bed, a filter, a reservoir and a cartridge.

24. The method of claim 21 wherein said porous silica microspheres are separated from said reaction mixture by simple filtration or centrifugation.

25. Highly purified, porous silica microspheres, having nominal diameters in the range of from about 10 microns to about 200 microns, and a porosity of at least about 50%, said microspheres containing functional groups which are capable of binding with an impurity in a reaction medium containing the impurity and a reaction product, and selectively removing the impurity.